

Status on Developing IEEE Standard P1547 for Interconnecting Distributed Resources with Electric Power System

**Distributed Energy Resources - The Power to Choose
1st DOE DER Conference and Peer Review**

**November 28-30, 2001
Loew's L'Enfant Plaza Hotel
Washington, DC**

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IEEE Interconnection Standard P1547

- **Title:** *Standard for Interconnecting Distributed Resources with Electric Power Systems*
- **Scope:** This standard establishes criteria and requirements for interconnection of distributed resources (DR) with electric power systems (EPS).
- **Purpose:** Provide a uniform standard for interconnection of distributed resources with electric power systems, and requirements relevant to the performance, operation, testing, safety considerations, and maintenance of the interconnection.
- **Sponsor:** IEEE SCC21 -- *Fuel Cells, Photovoltaics, Dispersed Generation, and Energy Storage*; Chair, R. DeBlasio.



IEEE P1547/D8 Contents

- INTRODUCTION
- 1.0 OVERVIEW
- 2.0 REFERENCES
- 3.0 DEFINITIONS and ACRONYMS
- 4.0 INTERCONNECTION TECHNICAL SPECIFICATIONS AND REQUIREMENTS
- 5.0 TEST SPECIFICATIONS AND REQUIREMENTS
- ANNEXES – INFORMATIVE
 - ANNEX A -- FLICKER INFORMATION
 - ANNEX B -- INTERCONNECTION TESTS
 - ANNEX C -- COMMISSIONING TESTS
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Technical Requirements Fall Into Several Categories

- General Requirements
- Response to Area EPS Abnormal Conditions
- Power Quality
- Islanding
- Test Specifications and Requirements



P1547 Development Approach

- **Voluntary consensus standard**
 - Hallmark of the standards process
 - Open to all dedicated parties
 - IEEE ballot member categories:
 - General Interest, Producer, User
- **Fast-track schedule**
 - April 1999 -- IEEE approved P1547 project
 - March 2001 – Completed initial ballot action
 - October 2001 – Completed ballot recirculation



IEEE P1547 Development Status

- **Ballot of Draft 7: Feb. 27 - Mar. 28, 2001**
- **Recirculation ballot Draft 8 Completed 10/2/01**
 - Draft 8: 34 pages of criteria, requirements, and information
 - 167 Ballot members
- **P1547 Working Group (WG) at 350 members**
- **P1547 WG organization**
 - R. DeBlasio (NREL) -- Chair
 - J. Koepfinger (Duquesne) -- Vice Chair
 - F. Goodman (EPRI) -- Vice Chair
 - T. Basso (NREL) -- Secretary
- **Meetings every 2 months (started Dec. 1998)**
- **Last P1547 WG Meeting October 16-19, 2001**
 - Draft 7 ballot and Draft 8 recirculation ballot results
 - Prospective new IEEE DR project activities
- **P1547 Web site <http://grouper.ieee.org/groups/scc21/1547>**



IEEE P1547 Interconnection Standard Status

(Requirements for adoption: 75% return, 75% affirmative)

Round 1

- Balloting completed 4/1/01
- 91% ballot returns
- 66% affirmative
- Addressed negative comments

<u>Voter Category</u>	<u>Affirm</u>	<u>Negative</u>
- User	30	23
- Producer	35	12
- General Interest	28	15

Round 2

- Recirculation 10/2/01
- 96% ballot returns
- 66% affirmative
- Draft 8 recirculation TBD

<u>Voter Category</u>	<u>Affirm</u>	<u>Negative</u>
- User	25	33
- Producer	43	6
- General Interest	35	14

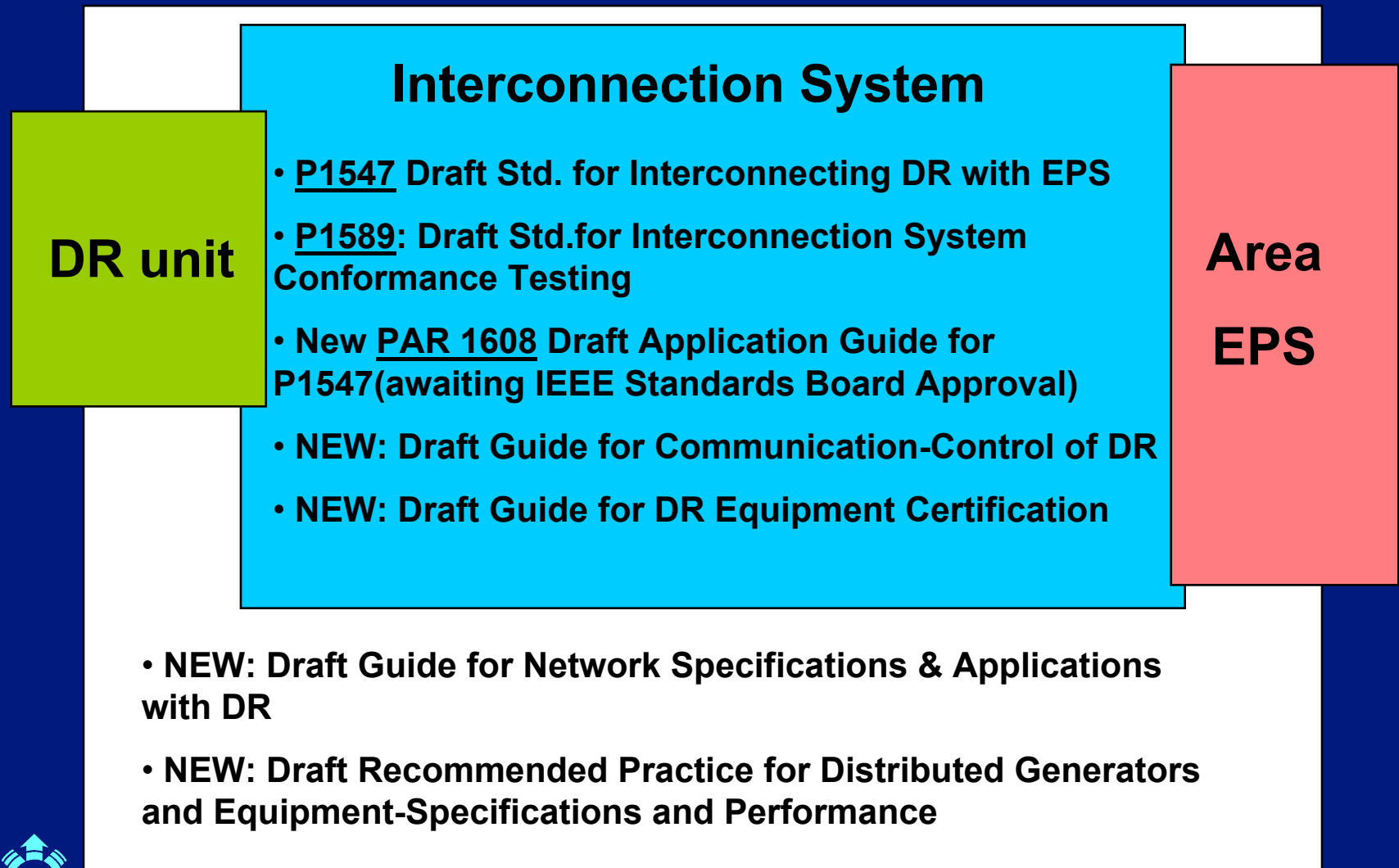


SOME KEY ISSUES

- **MINIMUM VS MAXIMUM REQUIREMENTS**
- **FIELD TESTING VS TYPE TESTING**
- **SECONDARY GRID AND SPOT NETWORKS**
- **GRID/DG MONITORING AND CONTROL**
- **VOLTAGE REGULATION/STABILITY**
- **GROUNDING/FAULTS**
- **DG PENETRATION/AGGREGATION**



Prospective New IEEE DR Activities



NREL DER Test Facility

Interconnection and Systems Integration

Testing includes:

Validation of IEEE P1547 Requirements

Development of IEEE P1589 Test Procedures

Currently testing microturbines and inverters

Capstone 30 kW
Microturbine



Two 100kW Load Simulators



200 kW Grid Simulator



PV Array



Inverters



DOE Distributed Power Program

Field Validation Testing at the Nevada Test Site

- Distributed Power Program conducted exploratory field tests (November 12-16, 2001).
- To validate interconnection and commissioning tests included in the IEEE P1547 interconnection standard.



Feeder 25-1202 at Area 25 of Nevada Test Site

DOE Distributed Power Program

Field Validation Testing at the Nevada Test Site

- Participants: NREL, INEEL, Bechtel/NV, ASCO
- Tested ASCO Soft-Load Transfer Switch (100kW genset) and Xantrex 5548 Inverter (5 kW)
- P1547 Tests Conducted: Under-Voltage, Over-Voltage, Under-Frequency, Over-Frequency, Anti-Islanding
- Results published early next year



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- **NREL --** <http://www.nrel.gov>
- **IEEE SCC21 -- IEEE Standards Coordinating Committee 21 on Fuel Cells, Photovoltaics, Dispersed Generation, & Energy Storage**
 <http://grouper.ieee.org/groups/scc21/>
- **P1547 Interconnecting Distributed Resources With Electric Power Systems -- web site and archives**
 <http://grouper.ieee.org/groups/scc21/1547>
 <http://grouper.ieee.org/groups/scc21/1547/archives/>
- **DOE Distributed Power Program**
 <http://www.eren.doe.gov/distributedpower>

